

Poa kyongsongensis Chung in Kyongsong, Hamgyong-pukto,
Poa takeshimana Honda in Ullungo Do,
Poa ullungdoensis Chung in Ullung Do,
Puccinellia coreensis Honda in Mokpo and Cheju Do,
Sasa coreana Nakai in Hamgyong-pukto,
Sasa quelpaertensis Nakai in Cheju Do,
Sasamorpha borealis (Hack.) Nakai var. *chiisanensis* (Nakai) Chung in Mt. Chiri,
Setaria lutescens (Weigel) Hubb. var. *dura* Chung in Sohuksan Do,
Tripogon chinensis Hack. var. *coreensis* Hack. in Chinnampo, Sorai in Whanghaedo, and Cheju Do,

Tripogon chinensis Hack. var. *longiaristata* (Honda) Chung in Cheju Do.

Distribution of the grasses in Korea and the nearest systematic and geographic relationships of endemic species are fully discussed in the *Manual*. A brief classification of the grasses by habitats and a list of the important collections of Korean grasses in four herbaria of U. S. A. are given. A map of Korea with three divisions (North, Central, and South) is included, and the latter indicates location of the important localities represented by collections in the four herbaria which have been cited.

ZOOLOGY.—A new species of *Pararchinotodelphys* (Copepoda: Cyclopoida) with remarks on its systematic position. PAUL L. ILLG, Department of Zoology, University of Washington.¹

(Received March 15, 1955)

Important revisions of concepts long held regarding ascidicolous copepods have resulted from recent contributions of Karl Lang (1948, 1949). His family Archinotodelphyidae (1949) is significant because it presents anatomical and ecological features which illustrate transition from casually occurring associates of ascidians to anatomically modified forms reflecting ecological dependence on these host organisms as providing either shelter or nutrition. He considers this family to occupy an intermediate position serving as the directly connecting link between the families Cyclopinidae and Notodelphyidae. The whole series then readily conforms to the long existing definition of the Cyclopoida Gnathostoma. The use of the order Notodelphyoida Sars is accordingly abandoned by Lang, and he further points out the logic of incorporating various ascidicolous copepods, other than notodelphyids, but included by Sars in his suborder, in some of the other subdivisions of the Cyclopoida. Two monotypic genera are recognized by Lang in the new family. The species here to be described is a congener of *Pararchinotodelphys phallusiae* (Hansen), 1923.

¹ Acknowledgment is made of technical assistance furnished through a research grant from Initiative 171 Fund, State of Washington.

Family ARCHINOTODELPHYIDAE Lang, 1949
Pararchinotodelphys Lang, 1949

The urosome in the female consists of the segment of the fifth legs, a complex genital segment, representing fusion of 1 anatomically thoracic segment and one anatomically abdominal segment, and three free abdominal segments. The antennule consists of many segments, 16 or 17 being the number so far known. The antenna is 4-segmented. The mandible palp has a 2-segmented endopodite and 4-segmented exopodite. The maxilliped is 3- or 4-segmented. The natatory legs have both rami 3-segmented. The fifth legs are 2-segmented; four setae are borne on the terminal segment, one on the basal segment at the distolateral corner. Type species, *P. phallusiae* (Hansen), 1923.

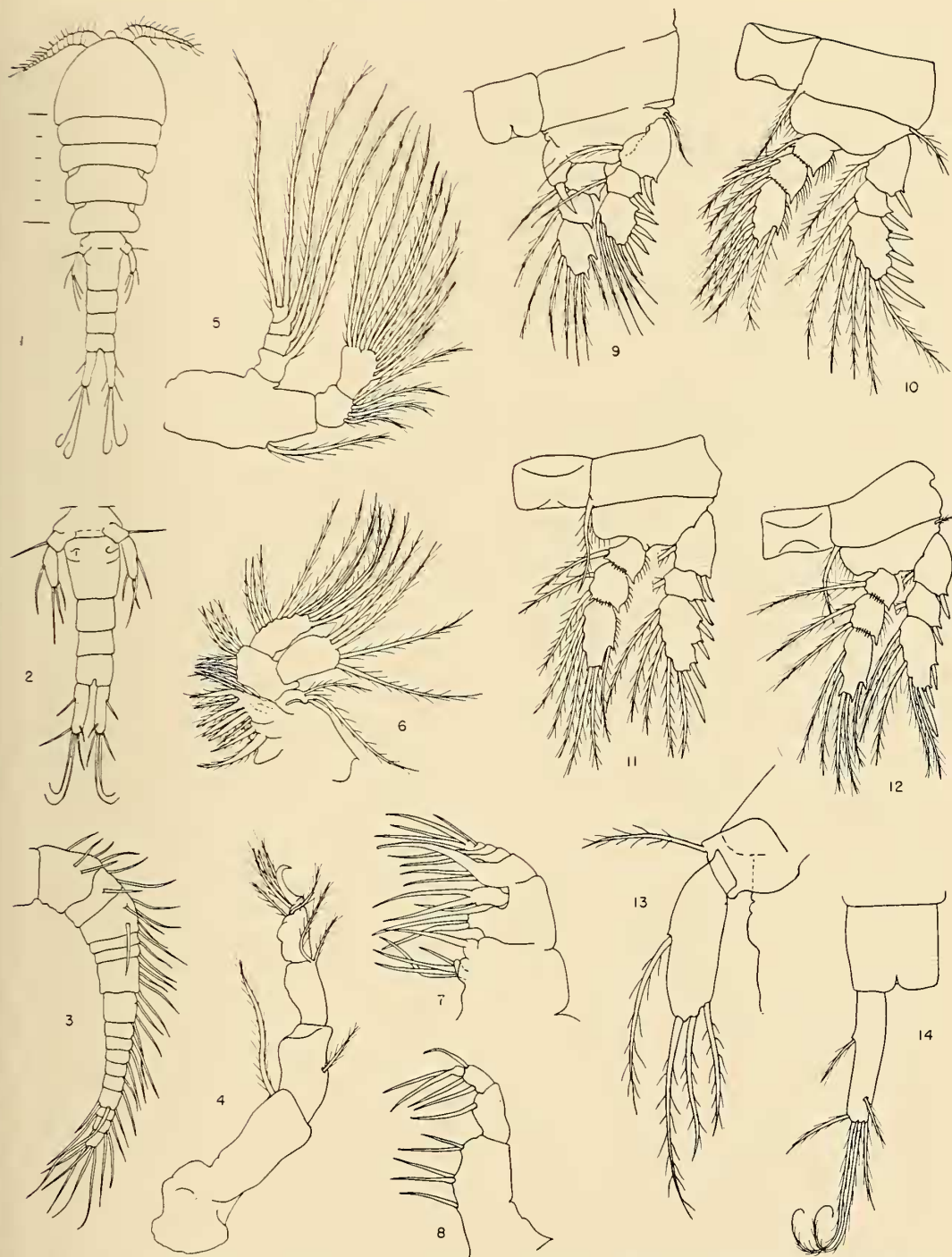
Pararchinotodelphys gurneyi, n. sp.

Figs. 1-14

Specimens examined.—4 females, all adult; from branchial cavities of specimens of *Styela partita* (Stimpson) (U.S.N.M. no. 3181), off Marthas Vineyard, Mass., *Fish Hawk* station 940, August 4, 1881, depth 134 fathoms.

Types.—Holotypic female, U.S.N.M. no. 97608; paratypes no. 92536; all from the one known collection.

Description.—FEMALE (Figs. 1-14): The body presents in outward aspect (Fig. 1) the generalized cyclopoid characters, such as those seen



FIGS. 1-14.—*Pararchinotodelphys gurneyi*, n. sp., female: 1, Habit, dorsal view (the accompanying scale represents 0.5 mm); 2, urosome, ventral view; 3, antennule; 4, antenna; 5, mandibular palp; 6, maxillule; 7, maxilla; 8, maxilliped; 9, first leg; 10, second leg; 11, third leg; 12, fourth leg; 13, fifth leg; 14, caudal ramus.

in the near relative *Cyclopina*. The cephalosome consists of the long segment of the head and maxillipeds; there is a free segment for each of the four pairs of swimming legs. The metasome accordingly is 5-segmented. The 5-segmented urosome (Fig. 2) consists of the somite of the fifth legs, a long genital somite, probably consisting of a posteriormost thoracic segment fused with the first segment of the abdomen, and three free abdominal segments, counting the segment supporting the caudal rami, which includes the anal aperture. Egg-sacks were not found. The structure of the urosome of the female demonstrates the fully adult condition. No incubatory cavity is developed.

The antennules (Fig. 3) are of moderate length, much greater in diameter basally than at the tip. There are 16 segments, of which the proximal is longest, although no segment is particularly elongate. There is a short second segment and the third approaches the first in length. These proximal three segments are of fairly uniform thickness and are succeeded by two short segments, each sharply graduated in diameter so that the appearance has a telescope effect tapering the appendage to the sixth and seventh segments, which are subequal in length and fairly sharply graduated in width. The succeeding segments are subequal in length and taper gradually to the narrow terminal segment. The setation is relatively profuse and exhibits no differentiation of particularly distinctive elements.

The antennae (Fig. 4) are 4-segmented. The lengths of the segments are graduated distally, the basal segment being somewhat over double the length of the distal one. In available preparations some of the details of ornamentation cannot be thoroughly made out. The basal segment has 1 long, fine inner seta, borne subterminally. The second segment has a single seta placed about midway on the margin opposite the setiferous edge of the basal segment. The third segment has two (or three) setae, originating from a common base on the distal margin. Forming an elaborate articulation with the tip of the terminal segment is a heavy, spirally curved, tapered hook. This structure is accompanied by three curved setae, in length about equal to the hook, and inserted in the articulating region. There are at least three additional minor subterminal setae.

The base of the mandible includes an expanded

coxa produced medially into a masticatory process. The medial portion of this process is a flat dentate plate, heavily chitinized. The upper medial corner of the plate terminates in a stout, tapered tooth, and there is a wide curved emargination between this tooth and a lower saw-like row of several closely spaced subequal teeth which form the remainder of the medial margin. The palp of the mandible (Fig. 5) consists of a basipodite and two rami. The ornamentation of the basipodite consists of a single, slight seta inserted somewhat distal to the midpoint of the medial margin. The endopodite is placed terminally on the elongate basis and is 2-segmented. Four setae are arranged in a close-spaced row on the distolateral portion of the medial margin of the proximal segment. The somewhat larger distal segment is ornamented with 10 setae, arranged in a compact row from the midpoint of the medial margin across the slightly expanded terminal margin. The endopodite is inserted considerably subterminally on the basis and consists of four segments. Each of the three proximal segments bears a long stout seta; there are 2 subequal setae on the terminal segment. The five setae of the ramus are graduated in length; all are stout and plumose.

The maxillule (Fig. 6) is the most complicated structurally of the mouthparts. The greatest mass of the appendage is the expanded and foliose proximal segment of the apparently bimerous protopodite, which seems to include, however, more than 2 of the several theoretically present protopodite segments of the generalized copepod maxillule. There are what appear to represent three endites disposed along the medial margin of the basal segment. The most proximally placed endite takes a wide insertion along most of the length of the axis of the segment and flares to form an expanded plate bearing medially along its margin eight tapered setae of varying proportions, all of which are directed medially. Proximally, the insertions of the setae tend to be removed progressively farther onto the anterior face of the process. Overlain by the flare of this major process are 2 small protuberances at the distal medial corner of the flattened segment. Each protuberance bears a slender, distally directed seta. The three setiferous processes of the segment would seem to represent 3 laciniae and indicate a coalescence of three archetypical segments to produce the arrangement here seen.

The basal segment supports a small lateral protuberance which seemingly represents a coalesced epipodite. This prominence bears two markedly unequal setae. The principal seta is elongate and tapering and proximally placed. It is directed proximally. The distal seta, which originates from a base very closely placed to that of the principal seta, is slender and short.

The distal segment of the protopodite is expanded medially and distally so that the apparently lateral margin bears both the rami of the limb. The medial margin of the segment supports two groups of setae, a proximal couple and a more distal group of four.

The endopodite is monomeric, tapered, with a more or less straight lateral margin and curving medial margin. Along most of the length of the medial margin and across the narrow apex are set 10 graduated slender setae. The apical setae are the longest. The exopodite is subquadrate and the wide distal margin supports four uniformly spaced, long, subequal setae, all profusely plumose.

The maxilla (Fig. 7) is 6-segmented. The basal segment is broadly expanded, although very flat, and bears two endites, each of which is somewhat suppressed to form a conical protuberance. The proximal prominence bears an apical group of four setae, of graduated size and with an intricate, closely spaced pattern of articulation. The distal endite has a single seta. The second segment, which narrows apically, bears two projections. A proximal conical endite, like those of the proximal segment, bears two setae. Distally there is a distinctly articulated rectangular arthrite which supports two long subequal setae and a much finer, shorter seta, the three arranged linearly along the medial margin.

The third segment is produced medially as a heavy, tapering, somewhat curved hook. There is no articulation of this structure with the main mass of the segment. Two slender subequal setae are borne on the hook-process, inserted at a point which should approximate the medial edge of the segment.

The distal portion of the appendage is a minute, trimerous cone, tapered apically. The two more proximal segments each bear a medial seta. The apical segment bears four setae, three terminal and one borne on the surface of the basal portion of the segment.

The maxilliped (Fig. 8) is tetramerous. The

basal segment much exceeds in mass the combined remainder. Five setae are inserted into a pattern composed of a proximal solitary seta, midmargin couple and distal couple, all on the medial margin of the segment. The second segment is about half the width of the first segment and its ornamentation consists of a single long seta set subterminally on the medial margin. The third segment is still slenderer and shorter than the second and supports two medial setae and a seta at the distolateral corner. The minute terminal segment has 2 long slender apical setae.

The 4 pairs of swimming legs are generalized in plan and seem to exhibit no modifications for other than a free-living existence. The segmentation and armature of these appendages may be represented as follows: Setae are designated in Arabic numerals following designation of spines in Roman. The segments of each ramus are accounted for in order from the basal segment distally. The armatures of the terminal segments are designated by listing in order lateral elements—terminal elements—medial elements. First exopodite I-1; I-1; III-I, 1-3; first endopodite 0-1; 0-1; 1-2-3. Second exopodite I-1; I-1; III-I, 1-4; second endopodite 0-1; 0-2; 1-2-3. Third exopodite I-1; I-1; III-I, 1-4; third endopodite 0-1; 0-2; 1-2-3. Fourth exopodite I-1; I-1; II-I, 1-4; fourth endopodite 0-1; 0-2, 1-2-2.

In the first legs (Fig. 9), it was impossible in the available material to determine whether the usual medial coxal setae are present. The legs of the pair are united by a well-developed intercoxal plate. The basipodite exhibits an oblique distal margin, the lateral edge of the segment being of such slight extent as barely to provide insertion for its slender seta. The medial margin is long, accommodating the marked distal prolongation which supports a stout, tapered, curved spine. Each of the rami consists of three subequal segments. The spines of the two proximal segments of the exopodite are roughly equal in dimension with the three subequal marginal spines of the distal segment.

The second legs (Fig. 10) consist each of a bimerous protopodite and of trimerous rami, the coxae yoked by the intercoxal plate. Each coxa bears a slender, relatively short seta at the distal medial corner. The very short lateral margin of the basis is set with a short, slender seta.

The third legs (Fig. 11) are almost identical in

proportion and ornamentation with the second legs.

The fourth legs (Fig. 12) consist of bimerous protopodites and trimerous rami. The intercoxal plate unites the paired legs. Each coxa bears a slender, rather short medial seta. Each basis bears a slender lateral seta.

The fifth legs (Fig. 13) are bimerous. The basal segment, probably representing the protopodite, although the exact homology is not clear, equals about half the bulk of the distal segment. The presence of a slender seta on the distolateral corner of the proximal segment lends weight to the established practice of referring to it as the basipodite. The distal segment is a flat plate, elongate and with its width about a third of its length. A seta is set at about the midpoint of the lateral margin, there is a stout long apical seta and 2 slenderer, subequal setae arranged subterminally rather close together on the apical fifth of the medial margin.

The caudal rami (Fig. 14) are of generalized cyclopoid aspect, the length of each about five times its greatest width. Basally each is more expanded than distally, with the lateral edge exhibiting a sharp emargination about a third of the length of the ramus distal from the base. The emargination is set with a slender seta, in length equal to about half that of the ramus.

There are four apical setae, the central two of the quartet long and stout. These measure about 1.5 times the length of the ramus. In the available specimens the exact relative lengths of these 2 setae could not be made out. The slender medial seta is somewhat exceeded by the lateral seta. A slender seta is set on the medial portion of the dorsal surface of each ramus subterminally about one-eighth the length of the ramus. The ciliation of all the setae is well developed.

No male has been found.

Remarks.—In comparing the present species to *P. phallusiae*, a number of differentiating characters are established which have been made use of in some slight revisions of the generic definition. In *P. gurneyi* the antennule is 16-segmented, that of *P. phallusiae* is apparently 17-segmented. The antennae seem basically similar in the two species but the terminal prehensile hook in *P. gurneyi* is much stouter and more highly developed. The mandibles correspond in the two species, but in *P. gurneyi* the exopodite is shorter and the segments more compressed together. The

maxillule is somewhat more complicated in *P. gurneyi* and the protopodite bears a medial setiferous projection not accounted for in *P. phallusiae*. The maxillae cannot adequately be compared in the two species on the basis of available information. The maxilliped in *P. phallusiae* is 3-segmented evidently exhibiting a coalescence of terminal segments which are free in the tetramerous appendage of *P. gurneyi*.

The first three swimming legs are not described for *P. phallusiae*. In the fourth legs the formula for armature is apparently exopodite I-1; I-1; 1-4; endopodite 0-1; 0-2; 1-2-2, which would correspond exactly to *P. gurneyi*. The fifth legs in the two species are essentially similar except that in *P. gurneyi* the medial seta of the distal segment is much more nearly subterminal in position. Body segmentation in the two species corresponds in general.

It is necessary here to consider also the species *Pseudocyclopina belgicae* (Giesbrecht). Lindberg (1952) has pointed out the close relationship of this copepod to *Pa. phallusiae*; in fact he has made the two species congeneric. Agreement with this view would have to shift generic assignment of *Pa. phallusiae* and *Pa. gurneyi* to Lang's prior genus *Pseudocyclopina* (1946) and in turn might then logically require removal of the genus from the Cyclopinidae to the Archinotodelphyidae.

In antennular segmentation *Pa. phallusiae* and *Ps. belgicae* correspond; *Pa. gurneyi* differs by possession of 1 less segment. The difference is scarcely to be regarded as other than of specific importance. In the antenna *Ps. belgicae* lacks the inner seta of the basal segment and in the two terminal segments shows neither the tendency to shortening of the segments nor development of prehensile elements among the terminal armature, all of which features characterize the other two species.

The mandible of *Ps. belgicae* exhibits the distinctive cyclopinid feature of reduced setation of the segments of the endopodite, possessing three setae on the basal segment, six on the distal segment, contrasting thus with the other species. The maxilliped of *Ps. belgicae* is more distinctively cyclopinid in the possession of seven segments. The development of the two basal segments is more or less comparable to that in the three archinotodelphyid species.

The first leg is not known for *Pa. phallusiae*.

In possession of two setae on the second segment of the endopodite *Ps. belgicae* presents a notable difference from *Pa. gurneyi*. The presence of three spines on the terminal segment of the exopodite in *Ps. belgicae* as compared to four such spines in *Pa. gurneyi* is a less distinctive difference. The fourth leg corresponds in the 3 species but might further be said to conform to a widespread condition found among cyclopiniids and notodelphyids in general, at this level offering no significant clue to generic affiliation. In the fifth leg all three archinotodelphyids agree and *Ps. belgicae* markedly disagrees in the possession of two setae on the basipodite in the female.

Taxonomic separation of *Ps. belgicae* is then readily made on the basis of differences in the armature of the mandibles, segmentation of the maxilliped, armature of the first legs and in the structure of the fifth legs. These differences are at a level customarily held to be of generic rank in the treatment of related copepods. Several still unknown quantities leave room in certain measure for a future reopening of the issue. Comparison of the maxillules and maxillae of *Ps. belgicae* and *Pa. phallusiae* must await re-description of the species. Description of the first leg of *Pa. phallusiae* is also a desideratum. Further, a most striking sexual dimorphism in *Ps. belgicae* separates it strongly from all cyclopiniids. No male is yet known from any of the three archinotodelphyid species. However, the present conclusion must be to retain Giesbrecht's species in systematic separation and *Pseudocyclopina* must currently be regarded as a genus placed without any undue difficulty in the family Cyclopiniidae.

The differentiation of *Pararchinotodelphys* from *Archinotodelphys*, as set forth by Lang (1949) is readily maintained. The difference in segmentation of the urosome in the female, the difference in number of setae of the basal antennal segment, the differences in segmentation of the maxilla and maxilliped and the possibility of difference at generic level of the armature of the maxillule are here recognized as the basic considerations.

The distribution of taxonomic characters through the cyclopiniids, archinotodelphyids and notodelphyids presents at the current stage of information certain puzzling aspects. Discussion of some of these is pertinent in explanation of the

systematic disposition applied in the present study. With reference to body segmentation, two important characters found among archinotodelphyids deserve analysis. The first character is the condition of the thoracic segment of the first pair of swimming legs. All three species exhibit this as a free segment. In cyclopiniids this segment is typically fused in a cephalosome complex. Among notodelphyids this segment may be free or fused. In *Notodelphys* it probably is typically free (cf. Stock, 1951, p. 1). The claim has frequently been made that fusion is the primitive condition. Evidence, however, is so contradictory and confusing that it seems impossible to assign this character as a criterion at a high level of systematic significance. It seems to be a character of sufficient plasticity as to have no pertinence at other than the specific or generic level.

The segmentation of the urosome presents an ambiguous morphological situation. The formation of a "genital segment" in the female by coalescence of the last thoracic segment with the first abdominal segment is a character of widespread distribution through the cyclopoids. Information from development is only fragmentary but the indication seems to be that free and separate segments appear as a first stage with the fusion secondary and appearing at the last molt. More information on the subject is needed. The very extent of occurrence of this fusion lends strong support to the view of it as a primitive character. The typical condition among the cyclopiniids seems to be fusion. It simply is not possible to say, however, that no female cyclopiniid can possess the alternative condition of completely free segments. In *Notodelphys* females the separated genital segment is typical. In some other notodelphyids with some otherwise primitive characters, as illustrated by *Doropygopsis*, the segments are fused. In *Pararchinotodelphys*, the segments are fused, therefore more like the cyclopiniids; the segments are free in *Archinotodelphys*. It becomes almost impossible here to say which of the conditions must be the primitive one; and, further, whether the primitive state in this one family is the same as that for the entire cyclopiniid-archinotodelphyid-notodelphyid series.

Morphological features of some of the appendages offer equally puzzling patterns of distribution. The species of *Pararchinotodelphys*,

in bearing a single medial seta on the basal antennal segment, conform to a generally prevalent condition among the cyclopinids. Information is not available as to whether the condition is invariable in the family, but no contrary instance seems to occur among available records. In *Notodelphys* and some other notodelphyid genera, two setae, conforming very well to the condition in *Archinotodelphys*, occur here.

If long-standing concepts of the structure of the maxillule are correct, the most primitive condition now known in the lineage could with almost equal justice be assigned to a notodelphyid, *Doropygopsis*, or to an archinotodelphyid, *Pararchinotodelphys gurneyi*.

In the latter, the correspondence with Gurney's scheme (1931, p. 57) of the generalized maxillule of the Copepoda is of interest. The elements of the most primitive grade of organization of the appendage would seem to be present here although in a different arrangement than is seen in the generalized types of other major sections of the copepods. The elements of the four segments of the basic protopodite would here be found arranged as two segments. The proximal segment bears three of the possible four laciniae internae and the single epipodite. The distal segment bears setae presumably representing a single endite, and articulates with the endopodite and exopodite. (What would explain the subdivision into two groups of setae as here seen, is difficult to explain in view of considering that a single lacinia interna supposedly is involved). In the main, however, this arrangement furnishes a neat correspondence to the basic calanoid arrangement and is in these regards the most primitive example of the maxillule among the Cyclopoida.

By comparison the maxillule of *Doropygopsis* would offer on one line of structural evidence a phylogenetic advance over the condition just described; on still another line, it exhibits what is seemingly a more primitive grade of construction. The medial setae and protuberances in this maxillule seem to offer grounds for interpretation as representing one less endite than would be found in *P. gurneyi*. In *Doropygopsis* there is the medial group of masticatory setae, a single seta inserted on a more distal protuberance, and finally a distal series of setae apparently referable to the basipodite. However, on this appendage the endopodite is bimerous. This condition is not known at all among the cy-

clopinids or archinotodelphyids so its occurrence here, as well as in *Pachypygus*, among the notodelphyids is difficult of explanation. It would contradict all experience with specializations among crustacean appendages to maintain that here the addition of a segment and addition of a number of setae would represent an advance in specialization rather than a primitive condition.

The endopodite is bimerous in the primitive calanoid maxillule and combination of the two lines of occurrence in *Doropygopsis* then would indicate that such would be the case in the archetypical cyclopoid, although there is no known example combining the primitive features of *Pararchinotodelphys* and of *Doropygopsis*. In *Canuella*, as an example of a primitive harpacticoid maxillule (Gurney, 1931, fig. 44), the appendage is seemingly more generalized than any known among cyclopoids and shows satisfactory correspondence to the archetypical condition hypothesized above.

In the case of the maxilla, a case much paralleling that of the maxillule occurs, but in less extreme measure. Reference to Sars (1918, pls. 8, 10) indicates that the cyclopinids *Pternopsyllus insignis* Brady and *Cyclopinella tumidula* Sars exhibit in this appendage characters which would customarily be regarded as primitive. Strong indications of a 6-segmented condition are present. The most distal portion of the appendage is a small trimerous unit, the apical segment bearing 4 setae. Reductions in this appendage are characteristic for the majority of cyclopinids. Among notodelphyids *Doropygopsis* exhibits the best approach to the 6-segmented condition. Among species of *Doropygus* the terminal segmentation and armature are most highly developed. Assembling these characters would produce a grade of structure approaching the basic cyclopinid condition. The condition in *P. gurneyi* would approach this generalized structure. In *Archinotodelphys* the segmentation is considerably suppressed and the armature reduced.

In the segmentation and armature of the swimming legs, the archinotodelphyids tend to resemble the cyclopinids closely. Their characters in this regard would enable them to fit with no question among the species in the parental family. Paradox again enters this situation when among the notodelphyids instances are found to occur in which the number of elements of

armature for a given segment exceeds that found for the same member in any archinotodelphyid. This would be illustrated by some *Doropygus* species, in which the terminal segment of the fourth exopodite bears four spines and five setae. As representative of the cyclopinids exhibiting this armature there seems to be known only *Paracyclopina nana*, a species admittedly well removed from a primitive position in the family by the reduced condition of other of its appendages. Perhaps this form lies close to the lineage of the archinotodelphyids, however.

The characters of the archinotodelphyids most strongly suggesting the intermediate position of the family between cyclopinidae and notodelphyidae are the antennae, the maxillipeds and the fifth legs.

In the antenna the bimerous terminal portion characteristic of the archinotodelphyids, and corresponding well to the cyclopinid condition, has never been found in notodelphyids. In all the latter the appendage is markedly more modified in segmentation, but as we have seen above, with reference to the setae of the basal segment, more primitive than in a typical cyclopinid.

The maxillipeds are not completely satisfactory as possibly directly ancestral structurally to the appendages found in the descendent family. However, in rough outline they indicate what the archetypal condition might have been with regard to segmentation. Indications as to the evolutionary development of the setal armature are not apparent.

In the Archinotodelphyidae, with the small number of 3 known species, the group as a whole exhibits a complex of primitive and advanced characters with no one member corresponding to the demonstrable archetypal requirements. A similar distribution of characters occurs in the obvious parental group, the Cyclopinidae, where in various members advanced characters combine with primitive, so that again no actual archetype occurs as a reality. Further, the descendent group of the Notodelphyidae repeats again the same combination. The situation is carried to its extreme by the fact that for various of the characters involved, the most primitive expression so far found has been in a representative of the notodelphyids, by common consent the most advanced group in the series. Our extension of knowledge among these groups has reenforced

our idea as to what the archetype for each and for all must have been, but these interesting creatures must still be numbered among the missing.

The foregoing discussion leads to the important decision as to the proper systematic treatment of the lineage under consideration. A most significant implication immediately appears, in that combinations of characters take great importance in here defining the taxonomic categories. By taking characters singly, logical application would most aptly lead to inclusion of all the cyclopinids, archinotodelphyids and notodelphyids within a single family. The naming of such a group would alone be a most unfortunate task to assign to any one. To submerge the historically significant implications of either of the genera *Notodelphys* or *Cyclopina* in deference to the other on any grounds should certainly lead to most aggravated nomenclatorial unpopularity. Further, such consideration of individual characters as are already available leads to the strong suspicion that the cyclopinids, archinotodelphyids and the notodelphyids are each polyphyletic as they now stand. The recent intensive fractionation of the cyclopinids in rapidly successive treatments by authors working with them would seem to bear out this point. There will doubtless be an eventual reconciliation of these groups within a single systematic category. By conventional applications within the classification of the copepods, however, it does not seem likely that the designation of this ultimate synthetic group will be at the familial level. Present lumping at this level then would be undesirable.

For present practice, as an alternative, the Archinotodelphyidae could be returned to the Cyclopinidae, retaining the Notodelphyidae in familial separation. This would involve only the submergence of a name of but a few years' standing. Such taxonomic treatment of these organisms is in line with the treatment of Lindberg. To qualify as perfectly acceptable cyclopinids, the 3 archinotodelphyid species would require little anatomical alteration, but actually considerably more than was pointed out in Lindberg's comparison of *P. phallusiae* (the only archinotodelphyid then known) with *Pseudocyclopina belgicae*.

The familial status of the Notodelphyidae is readily defended; they do present a complex of

distinctive characters. No known notodelphyid antenna shows the subdivision of the terminal portion into the clear-cut segments found throughout the cyclopinids and archinotodelphyids. The extremely high development of the terminal prehensile hook of notodelphyids is not equalled in the other groups. The maxilliped presents a difference of organization, especially with regard to the profuse setal armature on the basal segment in the notodelphyid. The fifth legs are distinctive in basic plan. Finally, the dorsal brood pouch is a feature which is universal in notodelphyids and unknown in the other groups. This series remains then a fairly strongly separated one.

A final consideration must be added. Lindberg's classification was proposed without his having opportunity to consider thoroughly the family Archinotodelphyidae (cf. Lindberg, 1952, footnote, p. 318). This family is now on the record and the definition is an adequate one. The addition of a new species has demonstrated, in the reappraisal of defining characters that there is strong evidence for a natural group here, defined by a complex of characters. The characters show overlapping in two directions, some occurring in the antecedent group, some in the descendent family. No purely archetypical species occurs in any one of the 3 separable lineages. Nor does there occur an actual transitional species for either of the gaps in continuity of distribution of the characters. The belated recognition of the existence of cyclopinids as forerunners of notodelphyids and the recent discovery of the archinotodelphyids combine to bring about the situation where the ultimate offshoot group is much better known anatomically and the range of variations more exhaustively explored than is the case for the parental series. Further, the

number of genera and of species described in the notodelphyids exceeds those of both the other families. On the basis of these features, with the strongly reinforcing conviction that a considerable majority of species remains undiscovered in this whole assemblage, the present treatment then maintains the separation of the 3 families.

REFERENCES

- GIESBRECHT, WILHELM. *Copepoden. Résultats du voyage du S. Y. Belgica en 1897-1898-1899 sous le commandement de A. de Gerlache de Gomery. Rapports Scientifiques, Zoologie*: 49 pp., 13 pls. 1902.
- GURNEY, ROBERT. *British fresh-water Copepoda* 1: liii + 238 pp., 344 figs. Ray Society, London, 1931.
- HANSEN, HANS JACOB. *Crustacea Copepoda, II. Copepoda parasita and hemiparasita. Danish Ingolf-Expedition* 3 (7): (2) + 92 + (2) pp., 5 pls. 1923.
- LANG, KARL. *Einige für die schwedische Fauna neue marine "Cyclopoida Gnathostoma" nebst Bemerkungen über die Systematik der Unterfamilie Cyclopininae*. Ark. Zool. 38A (6): 1-16, 7 figs. 1946.
- . *Copepoda "Notodelphyoida" from the Swedish west-coast with an outline on the systematics of the copepods*. Ark. Zool. 40A (14): 1-36, 1 pl., 17 text figs. 1948.
- . *On a new copepod family related to Notodelphyidae and on two new copepod species from South Georgia*. Ark. Zool. 42B (4): 1-7, 16 figs. 1949.
- LINDBERG, KNUT. *La sous-famille des Cyclopininae Kiefer (Crustacés copépodes)*. Ark. Zool. ser. 2, 4 (16): 311-325, 1 fig. 1952.
- SARS, GEORG OSSIAN. *An account of the Crustacea of Norway with short descriptions and figures of all the species* 6: Cyclopoida: xiii + 225 pp, 118 pls. Bergen, 1918.
- STOCK, J. H. *Some notes on Notodelphys rufescens Thorell, 1860, new to the Dutch fauna. Beaufortia (Miscellaneous series, Amsterdam Museum), no. 6*: 1-4, 7 figs. 1951.

ZOOLOGY.—*The isopod genus Chiridotea Harger, with a description of a new species from brackish waters*. THOMAS E. BOWMAN, U. S. National Museum. (Communicated by Fenner A. Chace, Jr.)¹

(Received January 31, 1955)

During the examination of samples collected by the Shad Investigations of the U. S. Fish and Wildlife Service from 1937 to 1941, numerous specimens of an unde-

scribed valviferous isopod of the genus *Chiridotea* Harger, 1878, were discovered. In this paper the new species is described, and certain additions and corrections are made to published accounts of the two previously known species of the genus.

¹ Published by permission of the Secretary of the Smithsonian Institution.